Quantum Physics

Bloch space structure of cascade, lambda and vee type of three-level systems and qutrit wave function

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The cascade, lambda and vee type of three-level systems are shown to be described by three different Hamiltonians in the SU(3) basis. We investigate the Bloch space structure of each configuration by solving the corresponding Bloch equation and show that at resonance, the seven-dimensional Bloch sphere ${\mathcal S}^7$ is broken into two distinct subspaces ${\mathcal S}^2{\times}{\mathcal S}^4$ due to the existence of a pair of quadratic constants. We also give a possible representation of the qutrit wave function and discuss its equivalence with the three-level system.

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